

Mixed Waste Management Facility Lawrence Livermore National Laboratory

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Mixed waste is a growing national problem. The U. S. produces an estimated 30,000 cubic meters annually and already has about 300,000 cubic meters in storage. Many medical procedures and technologies generate mixed waste, as did nuclear weapons production. Because there are few publicly acceptable treatment methods, most of this mixed waste must remain at its site of production. Other nations face the same problem.

Mission The Mixed Waste Management Facility (MWMF) Project will demonstrate safe, effective, and environmentally acceptable processes for treating low-level organic mixed waste. The project is a national test bed that will establish viable, benign alternatives to incineration. The MWMF will be an integrated, pilot-scale demonstration facility that leads bench-scale technologies to commercial-scale operation.

The MWMF Project will reduce risks associated with the deployment of immature technologies by addressing engineering scale-up issues, integrating processes into a pilot-plant setting, and addressing permitting and stakeholder issues.

The MWMF will begin operations with the first treatment demonstration systems in 1998. The project will continue to operate well into the next century, evaluating safer, faster, and more cost-effective treatment technologies.

Scope The project has two specific technical objectives: (1) to demonstrate safe, environmentally acceptable destruction of the organic components of typical DOE mixed wastes and (2) to demonstrate full integration of material management, waste preparation, emission control systems, water treatment, and preparation of solid waste forms meeting waste disposal requirements.

Molten Salt Oxidation (MSO), the first primary process technology selected, should be able to treat virtually all wastes that could be treated by incineration. In MSO, the organic portion of the waste is destroyed by catalytic oxidation in a fluid carbonate salt bath (700–950°C), which converts the organic material to carbon dioxide and water.

Inorganic residues, including the radioactive materials, are trapped in the molten salt. They are removed from the salt for processing into a final, nonleachable waste form, which is currently expected to be a ceramic. Excess halogen salts, such as sodium chloride, are also removed and processed for disposal; polymer encapsulation is currently expected to be used. The MWMF MSO system is designed to destroy wastes at rates of up to 20 kg/hr.

Because MSO is a catalytic, liquid-phase oxidation process, it does not exhibit the disadvantages of incineration.

Incineration destroys waste using controlled-flame combustion. MSO, however, destroys the waste in a liquid salt bath. The bath chemistry captures chlorine, preventing the formation of secondary toxins such as dioxin. The lower, stable bath temperature also essentially precludes other noxious emissions commonly associated with incineration.

Robotics The MWMF will demonstrate telerobots—robots with remote operators—to handle and sort mixed waste faster, more safely, and more cleanly than has been possible either manually or using older technologies.

Assurances The MWMF Project has three primary Environment, Safety, and Health (ES&H) assurance goals:

- Obtain approvals necessary to construct and operate the MWMF safely and in compliance with California regulations.
- Provide the EPA with satisfactory documentation to support permitting of an alternative treatment technology as allowed under Federal regulations.
- Establish a roadmap for completing ES&H documentation to deploy demonstrated technologies at LLNL or elsewhere.

Participation The goal of the project's public participation process is to assure that MWMF activities are conducted in a manner acceptable to the public, that the process demonstrations meet scientific, economic, and public acceptance, and that there is a smooth transition from successfully demonstrated technologies to treatment. A National Review Panel, including representation from regulatory and government offices and from national environmental groups, is integral to the MWMF Project.

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